

Work Order ID 86053

86053

Page 1

June 20-12 7:59:42 AM

Item ID: D212-664-107TRN

Accept

N900040100

Setup Start *NS1*

Revision ID:

Stop *NS2*

Item Name: Crosstube Turning Detail

Start Date: 20/06/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 04/07/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: *MLJ*

Date: *12/06/20* Tooling:

Date:

Run Start *NR1*

QC:

Date: SPC (Y/N):

Date:

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr

Revision Nbr

D212-664-147

Rev B(DE0)

100

0.00

100

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA705

2-Turn first side as per Folio FA113

3-Blend transition lines only, **do not sand whole tube**:

FOLIO REV: *21*

DWG REV: *21*

*Use mill bastard file, brush file repeatedly with file card.

*Do not use sandpaper coarser than 320 grit.

1 X

mm L

12/06/21

110

QC1- Inspect dimensions to dimension sheet

0.00

110

QC

Memo

0.00

Quality Control

1 Ø

mm L

12/06/21

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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NOTE: Date & initial all entries

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Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start ***NR1***

QC:

Date:

SPC (Y/N):

Date:

Stop ***NR2***

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

120

MORI SEIKI CNC LATHE LARGE

0.00

120

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA705

2-Blend transition lines only, **do not sand whole tube**.

*Use mill bastard file, brush file repeatedly with file card.

*Do not use sandpaper coarser than 320 grit.

FOLIO REV: A

DWG REV: B

3- Remove plugs and sand

1 \emptyset

mm.l
12/06/22

130

QC1- Inspect dimensions to dimension sheet

0.00

130

QC

Memo

0.00

Quality Control

1 \emptyset

mm.l
12/06/22

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Required Date: 04/07/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start ***NR1***

QC:

Date:

SPC (Y/N):

Date:

Stop ***NR2***

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

140

QC8- Inspect parts - second check

0.00

140

QC

Memo

0.00

Quality Control

[Signature] 12-6-26

145

0.00

145

Crosstubes

Memo

0.00

Crosstubes

GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.

Rm 12-7-3

150

~~Crosstubes Chemical Conversion~~

0.00

150

HandFXtube

Memo

0.00

Hand Finishing Crosstubes

[Signature]
1-Pressure Wash
2- Acid Etch

JW
Rm 12-7-3

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Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start ***NR1***

QC:

Date:

SPC (Y/N):

Date:

Stop ***NR2***

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

160

160

QC

Quality Control

~~QC3- Inspect Part Finish~~

QC5

Memo

0.00

0.00

170

170

Packaging

Packaging

Packaging

Memo

Identify and stock in kanban rack
Location: LG

0.00

0.00

180

180

QC

Quality Control

QC21- Final Inspection - Work Order Release

Memo

0.00

0.00

12-7-4

MO 12-7-4

12/7/4

11/2-07-4

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Picklist Print

June-20-12 7:59:47 AM

Page 1

Work Order ID: 86053

86053

Parent Item: D212-664-107TRN

D212-664-107TRN

Parent Item Name: Crosstube Turning Detail

Start Date: 20/06/2012

Required Date: 04/07/2012

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 08-03-06 DD Verified by:ec
IPP Rev B Removed polish 08.04.02 EC verified: DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6019-128		Manufactured	No			110	Each	45.0000	1	1			

D6019-128

Crosstube Material

Location

Loc Qty

Loc Code

LG

45

69803

21

75635

24

7

mm. 6 2/66/2

W/O:		WORK ORDER CHANGES					
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NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	86053
Description: Crosstube Assembly (205/212/412 Low Fwd)		Part Number:	D212-664-147
Inspection Dwg: D212-664-147 Rev: B		Page 1 of 2	

FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	0.313	+/-0.010	.313	/		vern	ENL-08
	2.360	+0.005/-0.000	2.360	/		↓	
	2.360	+0.005/-0.000	2.361	/			
	2.366	+0.005/-0.000	2.366	/			
	2.473	+0.005/-0.000	2.475	/			
	2.573	+0.005/-0.000	2.573	/			
	2.673	+0.005/-0.000	2.677	/			
	2.750	+0.005/-0.000	2.750	/			
	2.750	+0.005/-0.000	2.750	/			
SIDE B	0.313	+/-0.010	.313	/		vern	CURC-06
	2.360	+0.005/-0.000	2.363	/		↓	
	2.360	+0.005/-0.000	2.364	/			
	2.366	+0.005/-0.000	2.369	/			
	2.473	+0.005/-0.000	2.477	/			
	2.573	+0.005/-0.000	2.573	/			
	2.673	+0.005/-0.000	2.673	/			
	2.750	+0.005/-0.000	2.750	/			
	2.750	+0.005/-0.000	2.750	/			
	0.126.528	+/-0.020	126.528	/		type	LG-25

MAN.L
12/06/21

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

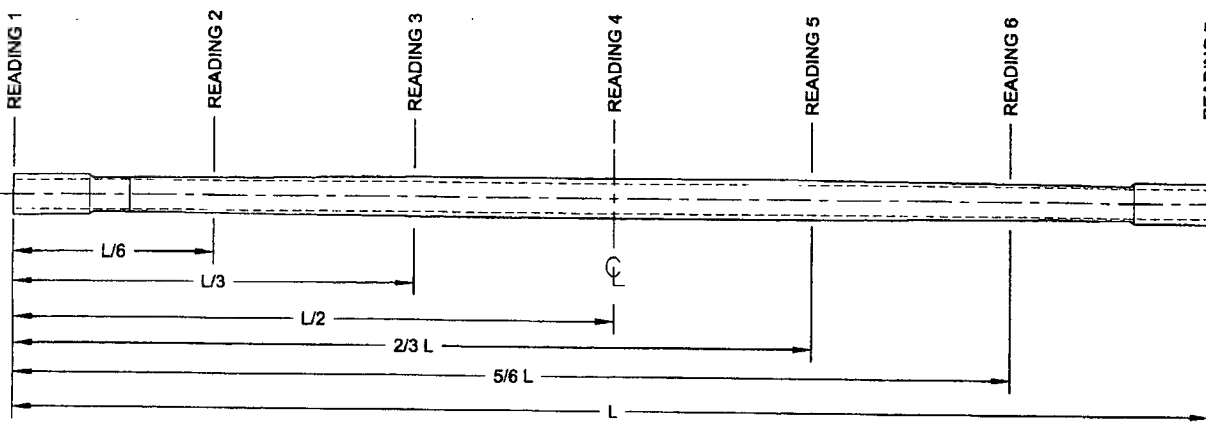
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DART AEROSPACE LTD		Work Order:	06053
Description: Crosstube Assembly (205/212/412 Low Fwd)		Part Number:	D212-664-147
Inspection Dwg: D212-664-147 Rev: B		Page 2 of 2	

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1	w2	w3	w4		
READING 1 L= 0"	.106	.128	.137	.142	.036	Acceptable 0.048" P 12/6/25 Dwg 12/6/25 = 0.210
READING 2 L= 14	.109	.138	.145	.123	.036	
READING 3 L= 30	.206	.235	.257	.214	.051	
READING 4 L= 63	.315	.328	.328	.316	.013	
READING 5 L= 30	.213	.227	.227	.215	.014	
READING 6 L= 14	.122	.130	.129	.124	.008	
READING 7 L= 0	.115	.127	.127	.127	.012	

Calibration Result

Actual Block Thickness: _____

Sitescan 250 Measured Thickness: _____

Measured by:	mm.c
Date:	12/06/22

Audited by:	MP
Date:	12-6-26

Prototype Approval:	N/A
Date:	N/A

Rev	Date	Change	Revised by	Approved
A	08.11.07	New Issue (P/O D212-664-107)	KJ/EC	
B	10.02.02	Dimension 126.528 was 126.53	KJ	
C	12.06.04	Wall thickness form added	KJ	

W/O:		WORK ORDER CHANGES					
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Item	Qty -147	Qty -147B	Part Number	Description
1	X		D212-664-147	CROSSTUBE ASSEMBLY (205/212/412 LOW FWD)
2		X	D212-664-147B	CROSSTUBE ASSEMBLY (214 LOW FWD)
3	1	1	D6019-128	CROSSTUBE
4	2	2	D2893-1	SUPPORT
5	4	4	D3595-063-450	RUBBER CUSHION
6	2	2	D3659-1	CUFF
7	4	4	MS21920-25	CLAMP (OR MS21920-26)
8	44	44	CR3212-4-06	RIVET (OR M7885/3-4-06)
9	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC 299-947-100, TYPE II, CLASS 2 ADHESIVE)
10	A/R	A/R	SIKAFLEX-241/-291	SEALANT (OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT)

GENERAL NOTES:

- 1) MATERIAL. MANUFACTURED FROM D6019-128
FINISHED LENGTH = 126.528±0.020 (BEFORE BENDING/TRIMMING)
- 2) FINISH. CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS. INCHES UNLESS OTHERWISE NOTED
- 5) BREAK SHARP EDGES. 0.005 TO 0.010 MAX
- 6) IDENTIFICATION. SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF
USING VIBRATING STYLUS
- 7) WEIGHT: D212-664-147 = 24.2 lbs (PER IIN-D212-664)
D212-664-147B = 24.2 lbs (PER IIN-D212-664)
- 8) PART IS SYMMETRIC ABOUT CENTERLINE
- 9) WHEN MACHINING TAPER, RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY. TRANSITION SHOULD
BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6%
BASED ON O.D. EXCEPT UP TO 10% IS ALLOWED IN AREA NOTED
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038
- 12) INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF
D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER
INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE D2893-1
SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE
SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS.
DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE
UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS
NOT BOTTOMED-OUT AFTER TORQUING
- 16) INSTALL D3659-1 CUFF AFTER CHEMICAL CONVERSION COAT BUT BEFORE PAINT. WITH A LAYER OF
SIKAFLEX-241/-291 OR PROSEAL 890 OR MIL-S-8802 CLASS B2 SEALANT BETWEEN CUFF AND CROSSTUBE.
SEAL EDGE OF CUFF TO ENSURE NO GAPS.
- 17) TOUCH-UP HOLES WITH CHEMICAL CONVERSION COAT

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO: 86053 MJS
12/06/20

DEO ATTACHED

Per ECD#1164
A 1103, 26
UNDER REVIEW
12/11/08/13

RELEASED
2009-10-29
MJS

B	REVISE GENERAL NOTES/PART LIST: UPDATE TO CURRENT STANDARDS; ADD -147B (ZN C4-2, D4-2)	RF	09.09.30
A	NEW ISSUE	CP	07.07.07
REV.	DESCRIPTION	BY	DATE
DESIGN	RF		
DRAWN	RF		
CHECKED	RF		
MFG. APPR.	RF		
APPROVED	RF		
DE APPR.	RF		
DATE	09.09.30		

DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWING NO. D212-664-147	REV. B SHEET 1 OF 4
TITLE CROSSTUBE (205/212/412 LOW FWD)	SCALE NTS
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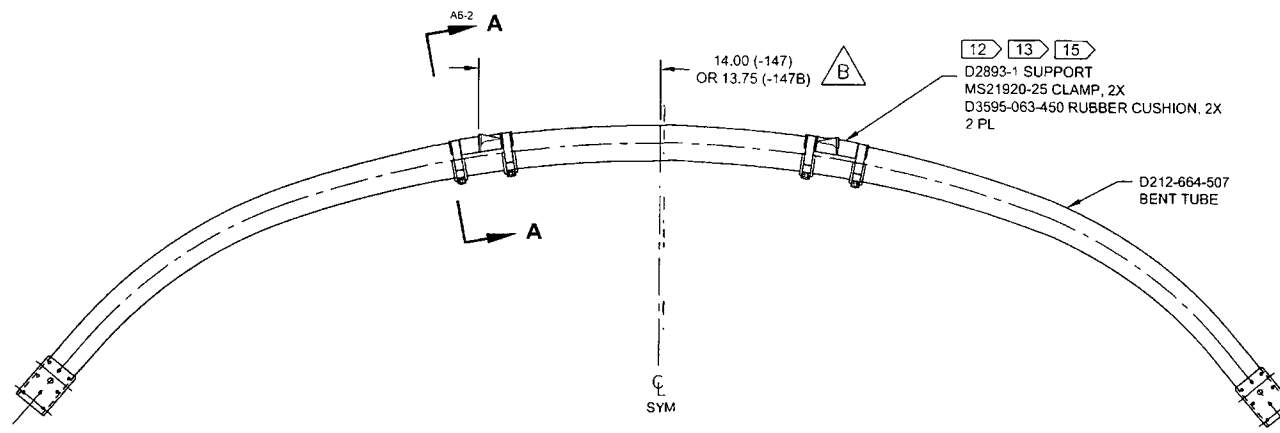
Dart Aerospace Ltd

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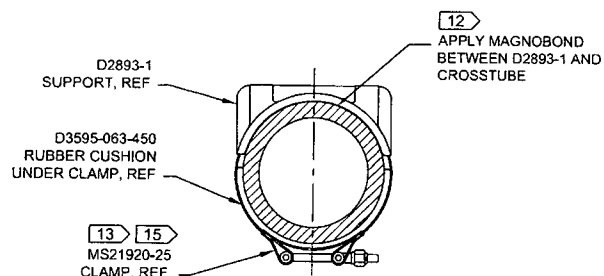
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96053

**D212-664-147/-147B
ASSEMBLY DETAIL**



SECTION A-A D5-2
SCALE 4X

DEO ATTACHED

ECU #11-614
K. 09.28
UNDER REVIEW
CP 11.06.13

RELEASED
2009-10-29

DESIGN	90	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	90	DRAWING NO.	REV. B
MFG. APPR.	18	D212-664-147	SHEET 2 OF 4
APPROVED	18	TITLE	SCALE
DE APPR.	18	CROSSTUBE (205/212/412 LOW FWD)	NTS
DATE	09.09.30	<small>COPYRIGHT © 2007 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

Dart Aerospace Ltd

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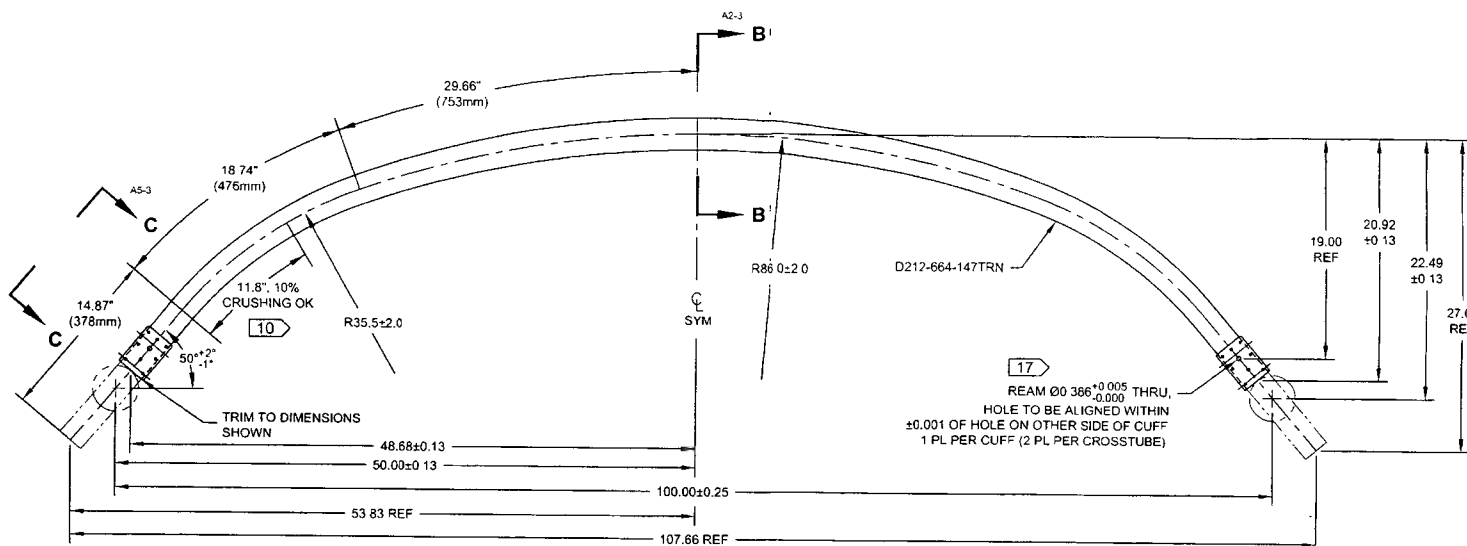
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Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

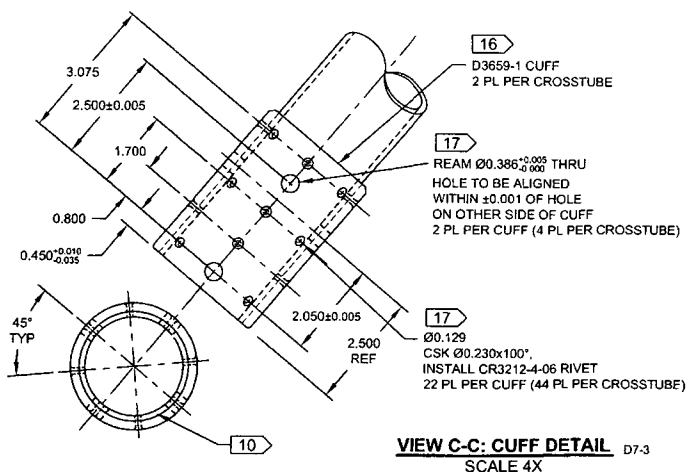
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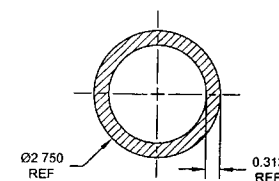
8 7 6 5 4 3 2 1



D212-664-507
BENDING AND DRILLING DETAIL



VIEW C-C: CUFF DETAIL
SCALE 4X



SECTION B-B
SCALE 4X

UNDER REVIEW

RELEASED
2009-10-29

DESIGN	Q	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	Q	DRAWING NO.	REV. B
MFG. APPR.	Q	D212-664-147	SHEET 3 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (205/212/412 LOW FWD)	NTS
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Dart Aerospace Ltd

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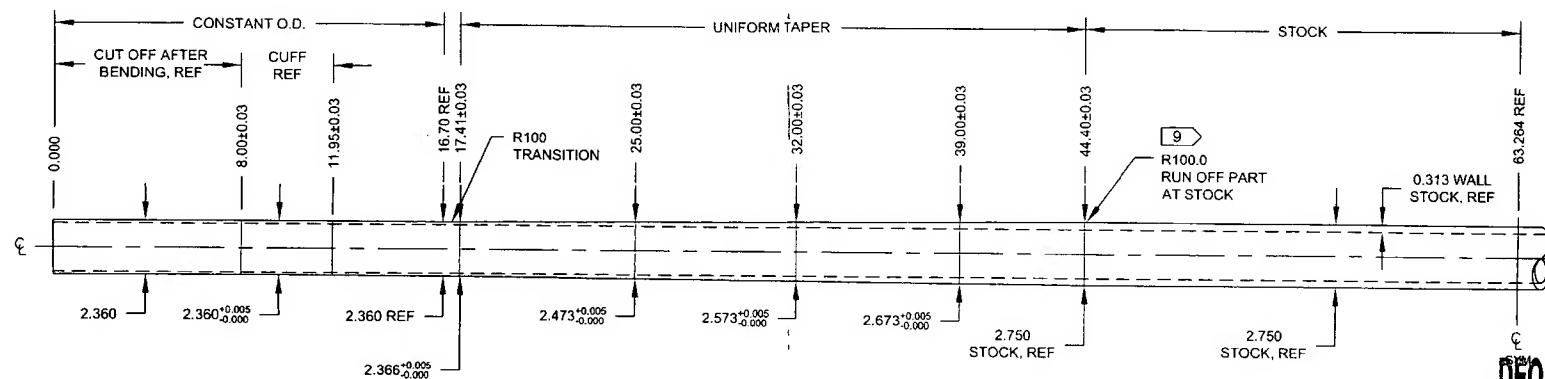
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NOTE: Date & initial all entries

86053



D212-664-147TRN
TURNING DETAIL

DEO ATTACHED

ECO #1-614
11.07.26
UNDER REVIEW
R. J. G. 13

RELEASED
2009-10-29

DESIGN	QF	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. B
MFG. APPR.	NS	D212-664-147	SHEET 4 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (205/212/412 LOW FWD)	NTS
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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DRAWING NO. D212-664-147	TITLE CROSSTUBE ASS'Y (205 LOW FWD)	REV. B	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D212-664-147-B-1	SHEET NO. SHEET 1 OF 1	SCALE NTS
DRAWN <i>Q</i>	CHECKED <i>ASS</i>	MFG. APPR. <i>18</i>	APPROVED <i>MD</i>		DE APPR. <i>H</i>		
DATE 11.07.15	DATE 11.07.20	DATE 11.07.21	DATE 11/07/21		DATE 11.07.21		

PURPOSE:

REPLACE MAGNOBOND WITH PROSEAL.

CHANGE:

IS:

Item	Qty -147	Qty -147B	Part Number	Description
9	A/R	A/R	PROSEAL 890 B-2	SEALANT, AMS-S-8802 CLASS B-2

WAS:

9	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)
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NOTE 12 & 15, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) TO INSTALL D2893-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.**

WAS:

- 12) INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

86053

RELEASED
2011-07-28
WV

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries